REMARKS

The Examiner has rejected claims 1-3, 5, 7-9, 11, 15-17, 19-21, and 25-27 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,412,896 to Takahashi et al ("Takahashi patent"). The Examiner has also rejected claims 4, 10, and 18 under 35 U.S.C. § 103(a) as being unpatentable over Takahashi patent. In addition, the Examiner has rejected claims 6 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Takahashi patent in view of U.S. Patent Application No. 2001/0043241 to Takahashi et al ("Takahashi application"). The Examiner has rejected claims 22-24 under 35 U.S.C. § 103(a) as being unpatentable over Takahashi patent in view of U.S. Patent No. 6,457,818 to Kurashima et al ("Kurashima"). The Examiner has also rejected claims 13 and 14 under 35 U.S.C. § 103(a) as being unpatentable over Takahashi patent in view of U.S. Patent Application No. 2003/0085962 to Junhua ("Junhua"). Claims 1-27 are currently pending. The following remarks are considered by applicant to overcome each of the Examiner's outstanding rejections to current claims 1-27. An early Notice of Allowance is therefore requested.

I. SUMMARY OF RELEVANT LAW

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The determination of obviousness rests on whether the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made. In determining obviousness, four factors should be weighed: (1) the scope and content of the prior art, (2) the differences between the art and the claims at issue, (3) the level of ordinary skill in the art, and (4) whatever objective evidence may be present. Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor. The Examiner carries the burden under 35 U.S.C. § 103 to establish a prima facie case of obviousness and must show that the references relied on teach or suggest all of the limitations of the claims.

II. REJECTION OF CLAIMS 1-3, 5, 7-9, 11, 15-17, 19-21, AND 25-27 UNDER 35 U.S.C. § 102(B) BASED ON TAKAHASHI PATENT

In paragraph 3 of the current Office Action, the Examiner rejects claims 1-3, 5, 7-9, 11, 15-17, 19-21, and 25-27 under 35 U.S.C. § 102(b) as being anticipated by Takahashi patent. This rejection is respectfully traversed and believed overcome in view of the following discussion.

With respect to this rejection, Examiner contends that Takahashi patent discloses all of the limitations of independent claims 1, 7, and 15. However, this assertion misconstrues the teachings of Takahashi patent.

Claim 1

Independent Claim 1 states, in part:

> "the actuator controller applies, in accordance with a one-dot printing instruction, to the actuator **an ejection pulse signal** that increases the volume of the liquid containing chamber to cause ejection of a droplet, **and subsequently only one additional pulse signal that increases the volume of the liquid containing chamber to pull back a part of the droplet about to be ejected**; and
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> "**a pulse width of the ejection pulse signal is A times a time T required for a pressure wave to propagate in one way longitudinally through the liquid containing chamber, where A is a positive constant less than 1.**" (emphasis added)

As a result, the droplet is not ejected immediately after the ejection pulse signal, but rather is ejected after the additional pulse signal.

Takahashi patent discloses two waveforms: waveform 1 (Fig. 4A) and waveform 2 (Fig. 4B). Examiner cites to waveform 2 as disclosing the above language of Claim 1. See Office Action (8/31/06), P. 3. However, this misconstrues the disclosure of waveform 2.

Takahashi patent specifically states that the ejection pulse B of waveform 2 ejects the ink droplet, and that the ejection stabilizing pulse D merely suppresses pressure vibrations in the ink channel. Takahashi patent, Col. 5, Lns. 65-67, Col. 6, Lns. 1-8. As such, the second pulse of waveform 2 does not "pull back a part of the droplet about to be ejected" as specified in Claim 1 of the current application. Rather, the ink droplet has already been

ejected before the ejection stabilizing pulse D ever occurs. Therefore, waveform 2 fails to disclose the pulse signals described in Claim 1.

Furthermore, Takahashi's waveform 1 also fails to describe the pulse signals of Claim 1. Waveform 1 includes an ejection pulse signal A for ejecting an ink droplet, and an ink droplet reducing pulse C for reducing the volume of the ink droplet ejected by the ejection pulse A. Takahashi patent, Col. 5, Lns. 10-13. However, the ejection pulse signal A equals the one-way pressure wave propagation time T. As such, Takahashi's waveform 1 fails to disclose "a pulse width of the ejection pulse signal is A times a time T required for a pressure wave to propagate in one way longitudinally through the liquid containing chamber, where A is a positive constant less than 1." Therefore, waveform 1 fails to disclose the pulse signals described in Claim 1.

Moreover, in a telephonic interview held on December 4, 2006, the Examiner agreed that Takahashi failed to teach the above claim language, and indicated that he would withdraw the above 35 U.S.C. 102(b) rejection.

As such, Applicant respectfully asserts that Examiner has failed to establish a prima facie case of anticipation of independent Claim 1, and corresponding claims 2, 3, 5, 19-21, and 25 because they are each dependent from Claim 1. Therefore, Applicant respectfully requests that Examiner remove the rejection of claims 1-3 and 5 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,412,896 to Takahashi et al.

Claim 7

Independent Claim 7 states, in part:

> "the actuator control device applying, in accordance with a one-dot printing instruction, to the actuator **an ejection pulse signal** that increases the volume of the liquid containing chamber to cause ejection of a droplet, **and subsequently only one additional pulse signal that increases the volume of the liquid containing chamber to pull back a part of the droplet about to be ejected**; and
>
> **"a pulse width of the ejection pulse signal is A times a time T required for a pressure wave to propagate in one way longitudinally through the liquid containing chamber, where A is a positive constant less than 1.**" (emphasis added)

This claim language is similar to that of the language of Claim 1 recited above. Therefore, for the same reasons discussed above with regard to Claim 1, and as admitted by the Examiner, neither waveform 1 nor waveform 2 of Takahashi discloses the pulse signals described in Claim 7.

As such, Applicant respectfully asserts that Examiner has failed to establish a prima facie case of anticipation of independent Claim 7, and corresponding claims 8, 9, 11, and 26 because they are each dependent from Claim 7. Therefore, Applicant respectfully requests that Examiner remove the rejection of claims 7-9, 11, and 26 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,412,896 to Takahashi et al.

Claim 15

Independent Claim 15 states, in part:

> "applying to the actuator **an ejection pulse signal having a pulse width of A times a time T required for a pressure wave to propagate in one way longitudinally through the liquid containing chamber, where A is a positive constant less than 1**, the ejection pulse signal increasing the volume of the liquid containing chamber to cause ejection of a droplet; and
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> applying to the actuator only one **additional pulse signal** after the application of the ejection pulse signal, **the additional pulse increasing the volume of the liquid containing chamber to pull back a part of the droplet about to be ejected.**" (emphasis added)

This claim language describes pulse signals similar to those described in Claim 1, as discussed above. Therefore, for the same reasons discussed above with regard to Claim 1, and as admitted by the Examiner, neither waveform 1 nor waveform 2 of Takahashi discloses the pulse signals described in Claim 15.

As such, Applicant respectfully asserts that Examiner has failed to establish a prima facie case of anticipation of independent Claim 15, and corresponding claims 16, 17, and 27 because they are each dependent from Claim 15. Therefore, Applicant respectfully requests that Examiner remove the rejection of claims 15-17, and 27 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,412,896 to Takahashi et al.

III. REJECTION OF CLAIMS 4, 10, AND 18 UNDER 35 U.S.C. § 103(A) BASED ON TAKAHASHI PATENT

In paragraph 5 of the current Office Action, the Examiner rejects claims 4, 10, and 18 under 35 U.S.C. § 103(a) as being unpatentable over Takahashi patent. This rejection is respectfully traversed and believed overcome in view of the following discussion.

Claims 4, 10, and 18 are each dependent upon one of independent claims 1, 7, and 15. As claims 1, 7, and 15 are allowable, so must be claims 4, 10, and 18. Therefore, Applicants respectfully request that Examiner remove the rejection of claims 4, 10, and 18 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,412,896 to Takahashi et al.

IV. REJECTION OF CLAIMS 6 AND 12 UNDER 35 U.S.C. § 103(A) BASED ON TAKAHASHI PATENT IN VIEW OF TAKAHASHI APPLICATION

In paragraph 6 of the current Office Action, the Examiner rejects claims 6 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Takahashi patent in view of Takahashi application. This rejection is respectfully traversed and believed overcome in view of the following discussion.

Claims 6 and 12 are each dependent upon one of independent claims 1 and 7. As claims 1 and 7 are allowable, so must be claims 6 and 12.

In contrast to the claimed invention Takahashi application provides a jet pulse signal which pushes out the ink in the ink chamber, however, a part of the ink droplet is pulled back in accordance with the first additional pulse signal, as a non-jet pulse signal is applied following the jet pulse signal, whereby the ejected ink droplet which is being ejected becomes smaller. A second additional signal is then applied which is used to stabilize the next ink ejection, hence causing the prevention of the drop in ink droplet speed. However, a volume of liquid to protrude from the nozzle on completion of the application of the ejection pulse signal can be reduced and a droplet to be ejected can have an even smaller volume than the volume of the liquid that has protruded from the nozzle with only an additional pulse in

this application. In other words, after the jet pulse signal is applied, **two** additional signals are required in the teaching of Takahashi application. (See Column 3, Lines 20-43).

In contrast to the teaching of Takahashi application, the claimed invention provides an ejection pulse signal that increases the volume of the liquid containing chamber to cause ejection of a droplet, and subsequently only one additional pulse signal that increases the volume of the liquid containing chamber to pull back a part of the droplet about to be ejected. Thus, in the claimed invention, the ink is stably ejected since an ejection of a minute droplet with a relatively high speed can be applied. See Paragraph [0009], [0038] – [0041]. As a result, a volume of the ejected droplet can be reduced and the droplets are stably ejected from the nozzles with only two pulses in total in the claimed invention.

Takahashi application, however, requires three pulses. It should be noted that less pulses are more optimal for a printing cycle, which is the period of time that the printer feeds paper from a particular dot. Thus, in other words, the claimed invention provides minute ink droplets while maintaining high speed ejection with only two pulses. In contrast, Takahashi application teaches utilizing three or more pulses. Therefore it is respectfully submitted that Takahashi application fails to teach or suggest an ejection of the pulse signal that increases the volume of the liquid containing chamber to cause ejection of a droplet, and subsequently only one additional pulse signal that increases the volume of the liquid containing chamber to pull back a part of the droplet about to be ejected.

Moreover, it is not obvious to apply the range of values described in Takahashi application to a waveform that includes only one additional pulse signal, because Takahashi application includes two additional pulse signals. A waveform with only one additional pulse signal behaves differently from a waveform with two additional pulse signals. Accordingly, ranges of values that apply to a waveform with two additional pulse signals are not readily transferable to a waveform with only one additional pulse signal.

Therefore, Applicants respectfully request that Examiner remove the rejection of claims 6 and 12 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,412,896 to Takahashi et al in view of U.S. Patent Application No. 2001/0043241 to Takahashi et al.

V. REJECTION OF CLAIMS 22-24 UNDER 35 U.S.C. § 103(A) BASED ON TAKAHASHI PATENT IN VIEW OF KURASHIMA

In paragraph 7 of the current Office Action, the Examiner rejects claims 22-24 under 35 U.S.C. § 103(a) as being unpatentable over Takahashi patent in view of Kurashima. This rejection is respectfully traversed and believed overcome in view of the following discussion.

Claims 22-24 are all ultimately dependent upon independent Claim 1. As Claim 1 is allowable, so must be claims 22-24. Therefore, Applicants respectfully request that Examiner remove the rejection of claims 22-24 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,412,896 to Takahashi et al in view of U.S. Patent No. 6,457,818 to Kurashima et al.

VI. REJECTION OF CLAIMS 13 AND 14 UNDER 35 U.S.C. § 103(A) BASED ON TAKAHASHI PATENT IN VIEW OF JUNHUA

In paragraph 8 of the current Office Action, the Examiner rejects claims 13 and 14 under 35 U.S.C. § 103(a) as being unpatentable over Takahashi patent in view of Junhua. This rejection is respectfully traversed and believed overcome in view of the following discussion.

With respect to this rejection, Examiner contends that Takahashi patent and Junhua disclose all of the limitations of independent Claim 13. However, this assertion misconstrues the teachings of Takahashi.

Independent Claim 13 states, in part:

> "**an ejection pulse signal that** increases the volume of the liquid containing chamber to cause ejection of a droplet and **has a pulse width of A times a time T required for a pressure wave to propagate in one way longitudinally through the liquid containing chamber, where A is a positive constant less than 1**; and
>
> only one **additional pulse signal** to be applied following the ejection pulse, **the additional pulse signal increasing the volume of the liquid containing chamber to**

pull back a part of the droplet about to be ejected."
(emphasis added)

This claim language describes pulse signals similar to those described in Claim 1, as discussed above. Therefore, for the same reasons discussed above with regard to Claim 1, and as admitted by the Examiner, neither waveform 1 nor waveform 2 of Takahashi discloses the pulse signals described in Claim 7.

As such, Applicant respectfully asserts that Examiner has failed to establish a prima facie case of obviousness of independent Claim 13, and corresponding Claim 14 because it is dependent from Claim 13. Therefore, Applicant respectfully requests that Examiner remove the rejection of claims 13 and 14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,412,896 to Takahashi et al in view of U.S. Patent Application No. 2003/0085962 to Junhua.

Based upon the above remarks, Applicant respectfully requests reconsideration of this application and its early allowance. Should the Examiner feel that a telephone conference with Applicant's attorney would expedite the prosecution of this application, the Examiner is urged to contact him at the number indicated below.

Respectfully submitted,

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